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ABSTRACT

Presented is a statement of goals and objectives for mathematics education for kindergarten through grade eight by the Department of Defense Dependents Schools. Directions and priorities are established and more specific instructional objectives for the listed grade levels are emphasized. The major program goals listed are: Number Awareness, Computational Skills, Problem Solving, Methods of Data Collection, Measurement, Prediction, Geometry, and Computer Literacy. These program goals and instructional objectives are listed according to kindergarten through fourth grade, fifth through eighth grade, and ninth through twelfth grade. (MP)

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K-12 Goals and Objectives With K-8 Scope and Sequence of Normal Expectancies

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DEPARTMENT OF DEFENSE
DEPENDENTS SCHOOLS

mathematics education

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FOREWORD

The kindergarten through grade twelve statement of goals and objectives establishes direction and priorities for the mathematics education within the Department of Defense Dependents Schools. The following kindergarten through grade eight scope and sequence emphasizes more specific instructional objectives at these respective grade levels. Both documents were developed through the cooperative efforts of dependent schools personnel, parents, students, and other members of the military community as part of the Five Year Curriculum Development Plan for the Department of Defense Dependents Schools.

Anthony Cardinale

Anthony Cardinale
Director

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INTRODUCTION

The mathematics curriculum can be described in terms of interaction among use, content, and ability. Use implies social, technical, and academic mathematics. The content domain refers to mathematical concepts and processes taught in our elementary and secondary schools. Abilities (or objectives) describe successive developmental levels in each student's acquisition of personal, social, environmental, vocational, and learning competencies.

Program goals and instructional objectives at successive developmental levels are included here according to each of three grade level groupings. In each instance, it is anticipated that students will be able to:

NUMBER AWARENESS. Identify the uniqueness of numbers, their meanings and relationships.

Rationale: The basic foundation of mathematics is the process of identifying the uniqueness of each number, its meaning, and its relationship to other numbers.

COMPUTATIONAL SKILLS. Demonstrate proficiency in computational skills.

Rationale: The role of computational skills is the proper utilization of number awareness, which combined with other basic skill areas provides the fundamental mathematical abilities needed to function effectively in today's technical environment.

PROBLEM SOLVING. Apply computational skills and mathematical reasoning in solving problems.

Rationale: Problem solving is the process of applying previously acquired computational skills and concepts to relevant situations by translating them logically into mathematical expressions, calculating the answers, and interpreting the results.

METHODS OF DATA COLLECTION. Demonstrate the ability to collect, reduce, display, and interpret data into meaningful and relevant terms.

Rationale: The existence of massive amounts of information requires that one should have the ability to collect, reduce, display, and interpret data into meaningful and relevant terms and proceed to extrapolate future implications.

MEASUREMENT. Demonstrate the ability to perform measurement in both metric and customary systems using appropriate tools.

Rationale: Measurement is the active process of comparing physical attributes of objects, measuring length, capacity, temperature, and time in international units; solving problems involving units of measurement in perimeter, area, and volume.

PREDICTION. Use mathematical data and concepts to make predictions.

Rationale: Prediction is the application of elementary probability and statistics as they numerically relate to chance events and their impact on gaming situations, natural phenomena, and representative sampling.

GEOMETRY. Know and apply geometric concepts.

Rationale: The study of geometry introduces the student to geometric shapes and their relationship to each other, develops a technical vocabulary, and an appreciation of the aesthetic beauty of forms in the natural-technological world.

COMPUTER LITERACY. Develop an understanding of the capabilities, applications, limitations and implications of computer technology on our society.

Rationale: It is predicted that within our lifetime, the computer will significantly alter the life of every human being on this planet. The power exists, it will grow. Someone will control it; someone will make decisions (computer based) that will affect all of us. Learning about the computer and considering its implications are essential.

GOALS AND OBJECTIVES	K-4	5-8	9-12
1. NUMBER AWARENESS: Identify the uniqueness of numbers, their meanings, and relationships.			
1.1 To recognize cultural and historical contributions of different number systems.	1.1.1 Demonstrate the ability to keep a count with simple "tally" notation.	1.1.2 Demonstrate the ability to read and write Roman numerals.	1.1.3 Demonstrate the ability to recognize and use other numeration systems.
1.2 To identify the properties of number sets and number systems.	1.2.1 Demonstrate the inverse relationship between addition and subtraction.	1.2.2 Recognize common fractions as decimal numerals.	1.2.3 Recognize fractional, decimal, and percent equivalencies.
1.3 To demonstrate the correct usage of mathematical terms and symbols.	1.3.1 Demonstrate the ability to use the terms "less than, greater than," and "equal to."	1.3.2 Recognize and know the facts of arithmetic. Recall number facts.	1.3.3 Demonstrate the ability to symbolically represent number quantities.
1.4 To apply concepts of estimation and judge the logical consistency of results based upon preliminary estimation.	1.4.1 Round off numbers to the nearest ten, hundred, or thousand.	1.4.2 Estimate the approximate result of computation.	1.4.3 Cost estimate an activity.
2. COMPUTATIONAL SKILLS: Demonstrate proficiency with computational skills.			
2.1 To demonstrate facility with four basic functions using whole numbers, decimals, and fractions.	2.1.1 Perform individual operations with whole numbers.	2.1.2 Perform individual operations or sequences of individual operations with whole numbers, decimals, or fractions.	2.1.3 Perform multiple operations with whole numbers, decimals and fractions.
2.2 To perform operations on sets of integral, rational, and real numbers.	2.2.1 Perform simple operations with sets of whole numbers.	2.2.2 Perform basic operations on sets of integers and rational numbers.	2.2.3 Perform elementary algebraic operations on sets of integral, rational, and real numbers.

NOTES:

GOALS AND OBJECTIVES	K-4	5-8	9-12
To apply computational skills to consumer and career activities.	2.3.1 Perform calculations and transactions involving U.S. and local currency.	2.3.2 Calculate quantities needed to accomplish jobs.	2.3.3 Perform computations related to specific careers and everyday life.
3. PROBLEM SOLVING: Apply computational skills and mathematical reasoning in solving problems.			
3.1 To recognize problem solving situations.	3.1.1 Use basic arithmetic reasoning in appropriate settings.	3.1.2 Recognize patterns and make simple generalizations involving number and geometric relationships.	3.1.3 Identify logical relationships among pertinent facts.
3.2 To apply problem solving strategies.	3.2.1 Use relevant facts to solve word problems.	3.2.2 Translate verbal statements into mathematical reasoning in the solutions of every day problems.	3.2.3 Demonstrate the ability to use a variety of techniques for the solution of problems.
3.3 To utilize appropriate computational aids in solving problems.	3.3.1 Solve mathematical problems utilizing concrete computational aids.	3.3.2 Solve mathematical problems utilizing mechanical and/or electronic computational aids.	3.3.3 Demonstrate the ability to utilize mechanical and/or electronic aids in the solution of mathematical problems.
4. DATA COLLECTION: Demonstrate the ability to collect, reduce, display, and interpret data into meaningful terms.			
4.1 To know and perform techniques of data collection.	4.1.1 Observe and record data.	4.1.2 Use a variety of methods to observe and record data.	4.1.3 Devise a process to collect information about a specific problem.
4.2 To utilize different methods of data presentation.	4.2.1 Display recorded data.	4.2.2 Determine the most appropriate means of displaying data.	4.2.3 Organize and summarize collected data in tabular and graphic forms.

NOTES:

4.3 To interpret displayed data.	4.3.1 Read and interpret picture, bar and line graphs.	4.3.2 Draw inferences from displayed data.	4.3.3 Recognize patterns and make generalizations about displayed data.
5. MEASUREMENT: Demonstrate the ability to perform measurements using appropriate tools.			
5.1 To utilize a systematic technique to perform measurements using standard units.	5.1.1 Demonstrate ability to measure length, weight, time, and temperature in standard units.	5.1.2 Perform more precise measurements.	5.1.3 Describe probable error in measurement.
5.2 To understand units of measure and compute relationships in standard units.	5.2.1 Compute area using standard units.	5.2.2 Compute volume using standard units of measure.	5.2.3 Compare metric and English units of measure and ease of use.
5.3 To apply concepts of estimation and approximation.	5.3.1 Describe ways to measure distance.	5.3.2 Estimate amounts of assembled objects.	5.3.3 Estimate the result of computations involving measured quantities.
6. PREDICTIONS: Use mathematical data and consistent patterns to make predictions.			
6.1 To recognize patterns and sequences.	6.1.1 Observe patterns and sequence in nature.	6.1.2 Qualitatively describe patterns and sequence in every day situations.	6.1.3 Quantitatively describe environmental patterns and sequence.
6.2 To analyze patterns and sequences.	6.2.1 Describe patterns in number sequences.	6.2.2 Identify and complete whole number sequences.	6.2.3 Predict missing terms in arithmetic or geometric sequences.

NOTES:

	K-4	5-8	9-12
6.3 To apply concepts and principles of probability and statistics.	6.3.1 Predict the outcome of paired events.	6.3.2 Describe the probability of an event occurring in terms of dependent variables.	6.3.3 Demonstrate the ability to solve problems involving permutations and combinations.
7. GEOMETRY: Know and apply geometric concepts.			
7.1 To recognize geometric shapes and to know the related technical vocabulary.	7.1.1 Identify geometric figures.	7.1.2 Know geometric shapes and objects, angles, lines similarity and congruence.	7.1.3 Know and apply geometric facts, e.g., Pythagorean theorem, angle relationships, etc.
7.2 To apply geometric concepts in describing the physical environment.	7.2.1 Find areas, perimeters, and volumes of simple plane and 3-dimensional objects.	7.2.2 To Construct geometric figures with compass, protractor, and straight edge.	7.2.3 Draw figures and make constructions to demonstrate inductive reasoning.
To appreciate aesthetic beauty in various forms and shapes.	7.3.1 Relate basic shapes to objects in the environment.	7.3.2 Identify and describe geometric forms in art and architecture.	7.3.3 Construct 3-dimensional objects, e.g., geodesic domes, model bridges, etc. Design and construct 3-dimensional objects.
8. COMPUTER LITERACY: Develop an understanding of the capabilities, applications, limitations, and implications of computer technology in our society.			
8.1 To understand the functions and use of the components of a computer system.	8.1.1 Describe a computer system.	8.1.2 Explain how a computer system works.	8.1.3 Discuss the interaction of the various components of a computer system.

NOTES:

GOALS AND OBJECTIVES	K-4	5-8	9-12
8.2 To utilize systematic processes in developing solutions to problem situation.	8.2.1 Use a stepwise procedure in problem solving, identify the problem, gather facts, select strategy, apply operation, and check the answer.	8.2.2 Make a flowchart to help describe the algorithm at each step of its design using the standard flowcharting symbols.	8.2.3 Identify appropriate uses of computers in problemsolving.
8.3 To analyze the role of computer technology in society, its past, present, and possible future impact upon human life.	8.3.1 Describe how computers are used in their school and community.	8.3.2 Identify examples of how computer technology has been used to benefit society.	8.3.3 Propose possible future uses of computer technology in society.

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APPENDIX I.

K-8 SCOPE AND SEQUENCE OF

NORMAL EXPECTANCIES

FOR

DEPARTMENT OF DEFENSE DEPENDENTS SCHOOLS

PREPARED IN CONJUNCTION WITH THE

DoDDS 5-YEAR CURRICULUM DEVELOPMENT PLAN

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PREFACE

The following scope and sequencing of **normal expectancies** is the result of cooperative efforts of DoDDS educators with K-12 classroom experience. Educator committees attempted to highlight specific skills upon which other learning could be developed. It is assumed that this will foster instructor flexibility in the selection of material and modes of presentation while providing guidelines to ensure consistency throughout the DoDDS system.

In accordance with the November 1976 report to the MCTM/NACOME Study Group which recommended that " . . . attention be given to sequencing of objectives," it is incumbent on each DoDDS region to develop curriculum guidelines which will ensure that these objectives are appropriately implemented within the curriculum. Future committees should periodically review and refine these guidelines in order to assure their continuous utilitarian value.

Goals/Objectives	NORMAL EXPECTANCIES

GRADE KINDERGARTEN

Primary Focus: A. Introduction of Vocabulary and Basic Concepts of Numbers
B. Numeration

1. NUMBER AWARENESS Identify the uniqueness of numbers, their meanings and relationships.	1. Use objects/pictures to show the meaning of the word set. 2. Identify equivalent sets. 3. Identify empty sets. 4. Identify order and reproduce numerals 0-10. 5. Identify corresponding sets with numerals and vice versa (0-10). 6. Count 0-30. 7. Recognize one-half of a region. 8. Use ordinal numbers first through fifth, and last. 9. Use pictures/objects to express general quantity terms such as much, many, some, few, as many as. 10. Differentiate objects, based on size and shape (larger and smaller; largest, smallest; taller, shorter; tallest, shortest; longer, shorter; longest, shortest; likenesses, differences etc.) 11. Compare quantities greater than, less than, equal to using 1 to 1 matching.
2. COMPUTATIONAL SKILLS Demonstrate proficiency with computational skills.	1. Manipulate objects to show sequence 0-10. 2. Manipulate objects to demonstrate one more, one less.
3. PROBLEM SOLVING Apply computational skills and mathematical reasoning in solving problems.	1. Manipulate objects to solve oral problems using numbers to ten.
4. DATA COLLECTION Demonstrate the ability to collect, reduce, display, and interpret data into meaningful terms.	1. Sort objects by shape, size, color and use. 2. Classify objects by common attributes.
5. MEASUREMENTS Demonstrate the ability to perform measurement in both metric and customary systems using appropriate tools.	1. Describe time, length, weight, temperature and height; hot, cold; heavy, light; long, short; etc.) 2. Recognize quantities of length, volume and weight. 3. Recognize penny, nickel, dime and quarter.

NOTES:

Goals/Objectives	NORMAL EXPECTANCIES
6. PREDICTIONS Use mathematical data and concepts to make predictions.	1. Recognize and repeat a pattern and sequence of objects and pictured objects. 2. Complete a sequence of numbers less than 10 both orally and in writing.
7. GEOMETRY Know and apply geometric concepts.	1. Recognize and name geometric shapes, i.e., circles, squares, triangles, rectangles and ovals. 2. Trace and reproduce geometric shapes.
8. COMPUTER LITERACY Develop an understanding of the capabilities, applications, limitations, and implications of computer technology in our society.	1. Organize pictures to complete a flowchart of events using stop, start, process, and flowline symbols.

GRADE ONE

Primary Focus: A. Development of Basic Concepts, Vocabulary and Skills of the Numeration System with Emphasis on Simple Addition and Subtraction of Whole Numbers.

1. NUMBER AWARENESS Identify the uniqueness of numbers, their meanings and relationships.	1. Recognize sets of 10. 2. Recognize ordered numbers as part of a number line. 3. Read, write, and match numerals with number words zero through ten. 4. Count 0-100 by ones, fives, and tens. 5. Read and write numerals 0-100. 6. Use objects and pictures to identify place value of 2 digit numerals. 7. Write numerals 0-100 from dictation. 8. Identify the use of zero as a place holder. 9. Recognize one-fourth of a region. 10. Read words for fractions one-half and one-fourth. 11. Use and read ordinal numbers first through tenth. 12. Compare quantities using symbols $>, <, \neq$. 13. Read, write, and use symbols and words $+, -, ¢$.

NOTES:

Goals/Objectives	NORMAL EXPECTANCIES
2. COMPUTATIONAL SKILLS Demonstrate proficiency with computational skills.	1. Add numbers 0-10 utilizing the number line and other manipulative aids. 2. Use symbols =, − + to perform computations. 3. Use commutative property of addition to complete equations such as 3 + 1 = + 3. 4. Subtract numbers 0-10 utilizing the number line and other manipulatives. 5. Complete number sentences using 1 digit numbers. 6. Master basic addition and subtraction facts through 10 using horizontal and vertical notation. 7. Make change from 10¢. 8. Write numbers as a collection of tens and ones for numbers 10-100.
3. PROBLEM SOLVING Apply computational skills and mathematical reasoning in solving problems.	1. Join and separate set of 10 or fewer objects and pictured objects to solve problems. 2. Tell which operation to use to solve simple story problems. 3. Write and solve equations for given pictured addition or subtraction problems. 4. Solve oral problems using facts through 10. 5. Solve oral problems using standard measurement units.
4. DATA COLLECTION Demonstrate the ability to collect, reduce, display, and interpret data into meaningful terms.	1. Read simple bar graphs and picture graphs. 2. Observe, record and graph information, as a group, with teacher help. 3. Make a picture graph from given data.
5. MEASUREMENT Demonstrate the ability to perform measurement in both metric and customary systems using appropriate tools.	1. Order objects by size and/or weight. 2. Use standard measurement units to determine length. 3. Recognize hour and half hour on clock. 4. Name the value of penny, nickel, dime and quarter in terms of cents.

NOTES:

6. PREDICTIONS Use mathematical data and concepts to make predictions.	1. Reproduce from memory a given pattern with no more than four items. 2. Complete a sequence of numbers less than 100, both oral and written.
7. GEOMETRY Know and apply geometric concepts.	1. Recognize, name and draw closed and open curves. 2. Relate basic geometric shapes to objects in the environment. 3. Identify and draw shapes in relation to objects in the environment. 4. Locate points that are inside, outside, and/or on geometric shapes.
8. COMPUTER LITERACY Develop an understanding of the capabilities, applications, limitations, and implications of computer technology in our society.	1. Logically arrange unorganized parts of picture flowcharts for everyday events (incl. decision symbol). 2. Draw a computer system (the room, machine, people).

GRADE TWO

Primary Focus: A. Expansion of the Numeration System with Emphasis on Place Value and Regrouping in Addition

1. NUMBER AWARENESS Identify the uniqueness of numbers, their meanings and relationships.	1. Recognize ancient number systems. 2. Recognize the set of odd or even numbers. 3. Recognize one-third of a region. 4. Read symbols 1/2, 1/4, 1/3. 5. Demonstrate the ability to use the number line from 0 through 100. 6. Count and write by two's (2's) through 100. 7. Read and write the number words eleven through twenty. 8. Use objects and pictures to show place value of digits in 3 digit numerals. 9. Read and write compact and expanded numerals through 100. 10. Express cardinal numbers as ordinal numbers. 11. Compare numbers through 100 to determine equality or inequality. 12. Read, write, and use symbol $.

NOTES:

2. COMPUTATIONAL SKILLS Demonstrate proficiency with computational skills.	1. Add and subtract using horizontal and vertical notation with sums through 18. 2. Group addends using parentheses and columns with sums to 18. 3. Complete equations using missing addends with sums to 18. 4. Add and subtract 2 digit numerals to include regrouping. 5. Add and subtract 3 digit numerals without regrouping. 6. Check addition and subtraction for accuracy. 7. Complete number-sentences using 2 digit numbers. 8. Master addition and subtraction facts through 18. 9. Make change from $.25 with pennies, nickels, dimes. 10. Manipulate objects to show fractional parts 1/2, 1/3, 1/4. 11. Name 1/2 of a set.
3. PROBLEM SOLVING Apply computational skills and mathematical reasoning in solving problems.	1. Join and separate sets of objects through 18 to solve problems. 2. Write the equation which would solve simple story problems. 3. Solve verbal problems using facts through 18 using regrouping of 2 digit numbers. 4. Solve verbal problems using standard measurement units. 5. Purchase items for 25¢ or less to involve making change.
4. DATA COLLECTION Demonstrate the ability to collect, reduce, display, and interpret data into meaningful terms.	1. Discuss information given in bar and picture graphs. 2. Draw simple bar and picture graphs from given data. 3. Select a subject, observe, record and graph data.
5. MEASUREMENTS Demonstrate the ability to perform measurement in both metric and customary systems using appropriate tools.	1. Use standard units to determine liquid amounts and weights. 2. Tell time in intervals of five minutes. 3. Use written notation for indicating time. 4. Name the value of half dollar and dollar in terms of cents. 5. Name equivalent values using coins of different denominations.
6. PREDICTIONS Use mathematical data and concepts to make predictions.	1. Recognize patterns of twos, threes, fives and tens using the number line. 2. Complete a sequence of numbers less than 999.

Goals/Objectives	NORMAL EXPECTANCIES
7. GEOMETRY Know and apply geometric concepts.	1. Recognize that geometric shapes are closed. 2. Discuss attributes of geometric shapes (circles, triangles, ovals, rectangles, squares). 3. Find geometric shapes in pictures. 4. Recognize and name cube, cone, and sphere.
8. COMPUTER LITERACY Develop an understanding of the capabilities, applications, limitations, and implications of computer technology in our society.	1. Identify missing steps in a sequence of events. 2. Describe major events in terms of component parts. 3. Give examples of how computers affect their families.

GRADE THREE

Primary Focus: A. Extension of the Numeration System and Its Grouping Concepts with Emphasis on Subtraction of Whole Numbers.
B. Introduction of Vocabulary and Basic Concepts of Multiplication and Division.

1. NUMBER AWARENESS Identify the uniqueness of numbers, their meanings and relationships.	1. Show how ancient math symbols were derived from natural shapes and forms. 2. Recognize multiples of numbers 1-6 through 60. 3. Use tally system as means of recording. 4. Read and write compact and expanded numerals through 1,000. 5. Read and write number words through ten thousand. 6. Recognize regions 2/2, 2/4, 3/4, 4/4, 2/3, 3/3. 7. Manipulate objects/pictures to identify fractions (halves, fourths, thirds up to whole). 8. Read and write symbols 1/2, 2/2, 1/4, 2/4, 3/4, 4/4, 1/3, 2/3, 3/3. 9. Compare numbers through 1,000 to determine equality or inequality. 10. Demonstrate property of oneness in multiplication. 11. Demonstrate property of zero in multiplication. 12. Estimate sums and differences of whole numbers. 13. Round whole numbers through 1,000 to nearest tens and hundreds.

NOTES:

2. COMPUTATIONAL SKILLS Demonstrate proficiency with computational skills.	1. Add and subtract 3 digit numerals with regrouping. 2. Add column of numbers up through 3 digits. 3. Make change from $1.00. 4. Demonstrate that multiplication is repeated addition. 5. Check addition, subtraction and multiplication for accuracy. 6. Use commutative and associative principles in addition and multiplication. 7. Master multiplication facts 0-6. 8. Demonstrate that division is the inverse of multiplication. 9. Name missing factor in relating multiplication to division. 10. Compute related division facts through 6 x 9.
3. PROBLEM SOLVING Apply computational skills and mathematical reasoning in solving problems.	1. Translate words to mathematical symbols. 2. Solve oral and written problems in addition and subtraction using numbers through 3 digits without and with regrouping. 3. Organize sets to solve oral and written problems in multiplication and division through the 6's. 4. Formulate oral and written problems by applying appropriate computational skills.
4. DATA COLLECTION Demonstrate the ability to collect, reduce, display, and interpret data into meaningful terms.	1. Read and discuss bar and line graphs. 2. Draw bar or picture graphs from given data. 3. Select a subject, collect, tabulate and graph data.
5. MEASUREMENTS Demonstrate the ability to perform measurement in both metric and customary systems using appropriate tools.	1. Use standard measurement units to measure temperature. 2. Tell time using clocks and calendars. 3. Identify relationships between units of time. 4. Measure the area of squares and rectangles using manipulative aids.
6. PREDICTIONS Use mathematical data and concepts to make predictions.	1. Complete a sequence of odd numbers and even numbers. 2. Identify and complete a sequence in which there is a pattern of addition or subtraction.

7. GEOMETRY Know and apply geometric concepts.	1. Identify and discuss the attributes of a parallelogram. 2. Describe a geometric figure as open or closed. 3. Identify angles which are right angles and which are not right angles. 4. Draw 2-dimensional figures using pencil and straightedge. 5. Use manipulatives to show the area of a square and rectangle. 6. Recognize and name cylinders.
8. COMPUTER LITERACY Develop an understanding of the capabilities, applications, limitations, and implications of computer technology in our society.	1. Use a stepwise procedure in problem solving: identify the problem, gather facts, select strategy, apply operation, check answer. 2. Describe how computers are used in their school and community.

GRADE FOUR

Primary Focus: A. Reinforcement of Addition and Subtraction of Whole Numbers.
B. Development of Basic Concepts, Vocabulary, and Skills of Multiplication of Whole Numbers.
C. Extension of Vocabulary and Basic Concepts of Division of Whole Numbers.
D. Introduction of Vocabulary and Basic Concepts of Decimals.

1. NUMBER AWARENESS Identify the uniqueness of numbers, their meanings and relationships.	1. Read and write Roman numerals to XII. (E)* 2. Recognize multiples of numbers up to 100. 3. Identify single digit factors of numbers thru 81. 4. Read and write number words and compact/expanded numerals through millions. 5. Use objects and pictures to compare and order fractions through eighths. 6. Recognize, read, and write fractional parts of a region including fifths, sixths, and eighths. 7. Identify numerators and denominators. 8. Compare numbers through millions to determine equality or inequality. 9. Use odd and even numbers to develop rules for finding sums and products. 10. Round whole numbers to nearest power of 10 through 1,000,000. 11. Estimate products and quotients of whole numbers. 12. Read and write decimals to hundredths. *(E) = Enrichment Skill.

NOTES

Goals/Objectives	NORMAL EXPECTANCIES
2. COMPUTATIONAL SKILLS Demonstrate proficiency with computational skills.	1. Add columns of numbers beyond 3 digits. 2. Add and subtract to include regrouping beyond 3 digits, including money with dollar and cent notation. 3. Add and subtract standard measures of length, volume, weight and time, with and without regrouping. 4. Master multiplication facts 7-9. 5. Multiply by one and two digits with regrouping. 6. Find products that have factors of 10, 100 or 1,000. 7. Use distributive principle in whole number operations. 8. Master division facts 1-9. 9. Divide by one digit with/without remainders. 10. Use divisibility rules for estimating the quotient. 11. Check computations for accuracy and reasonableness by comparison with estimate. 12. Compute averages of no more than 9 items. (E) 13. Add and subtract decimals to hundredths.
3. PROBLEM SOLVING Apply computational skills and mathematical reasoning in solving problems.	1. Solve oral and written problems in addition and subtraction using numbers beyond 3 digits and using multiplication and division through 9's. 2. Solve word problems involving addition and subtraction of decimals to hundredths. 3. Formulate oral problems involving appropriate computational skills. 4. Solve simple 2-step word problems, involving addition, subtraction and multiplication. 5. Use hand held calculators to: a. add, subtract, and multiply whole numbers, b. compute averages, c. solve problems involving money, and d. to check accuracy of manual computations.
4. DATA COLLECTION Demonstrate the ability to collect, reduce, display, and interpret data into meaningful terms.	1. Read and interpret bar and line graphs. 2. Draw line graphs from given data.
5. MEASUREMENTS Demonstrate the ability to perform measurement in both metric and customary systems using appropriate tools.	1. Identify relationships between units of measure (length, weight, volume). 2. Measure the perimeter of polygons using standard units. 3. Measure the area of triangles and quadrilaterals using manipulative aids.

NOTES:

Goals/Objectives	NORMAL EXPECTANCIES
6. PREDICTIONS Use mathematical data and concepts to make predictions.	1. Identify and complete a sequence in which there is a pattern of repeated multiplication or division. 2. Identify the probability that an event will occur.
7. GEOMETRY Know and apply geometric concepts.	1. Identify circumference and diameter of a circle. 2. Identify symmetric figures. 3. Use manipulatives to show the area of a triangle. 4. Draw and/or make models of geometric figures. 5. Recognize and name prisms. 6. Discuss the similarities and differences between 2 and 3 dimensional forms using sides, angles and edges. 7. Use coordinates to describe locations on the first quadrant of the coordinate plane.
8. COMPUTER LITERACY Develop an understanding of the capabilities, applications, limitations, and implications of computer technology in our society.	1. Name and describe three jobs in the computer field. 2. Identify examples of computer uses in business and industry.

GRADE FIVE

Primary Focus: A. Extension of the Numeration System with Emphasis on Multiplication and Division of Whole Numbers and Addition and Subtraction of Decimals.
B. Reinforcement of Addition and Subtraction of Whole Numbers.
C. Introduction of Vocabulary and Basic Concepts of Fractions and Multiplication and Division of Decimals.

1. NUMBER AWARENESS Identify the uniqueness of numbers, their meanings and relationships.	1. Read and write Roman numerals to XXV. (E) 2. Identify the factors of numbers. 3. Identify the common factors of a pair of numbers. 4. Identify the greatest common factor of a pair of numbers. 5. Identify the multiples of a number. 6. Identify the common multiples of a pair of numbers. 7. Identify the least common multiple of a pair of numbers. 8. Read and write number words and numerals beyond millions. 9. Recognize fractions beyond eighths. 10. Recognize and understand the meaning of mixed numerals.

NOTES:

	11. Rename improper fractions as mixed numbers and vice versa. 12. Compare written fractions >,<, =. 13. Compare whole numbers and whole number phrases with use of the symbols >,<, =. 14. Explain divisibility rules for 2, 3, 4. 5, 6, 8, 9, 10. 15. Use estimation in performing the division algorithm with a 2 digit divisor. 16. Determine the prime factorization of numbers. 17. Identify decimal place value to ten thousandths. 18. Compare decimals.
2. COMPUTATIONAL SKILLS Demonstrate proficiency with computational skills.	1. Multiply by 3 or more digits with regrouping. 2. Divide by 2 digits without and with regrouping. 3. Compute averages. 4. Perform the four basic whole number operations in connection with length, volume, weight and time without and with regrouping. 5. Add and subtract decimals to ten thousandths. 6. Multiply decimals so that the product has no more than four decimal places. 7. Divide decimals by whole numbers. 8. Find the greatest common factor. 9. Find the least common multiple. 10. Simplify common fractions to lowest terms. 11. Transform common fractions to equivalent fractions. 12. Change mixed numerals to improper fractions. 13. Change improper fractions to mixed numerals. 14. Find missing term in equivalent fractions.
3. PROBLEM SOLVING Apply computational skills and mathematical reasoning in solving problems.	1. Solve word problems, involving the four basic operations with whole numbers, in a logically structured method. 2. Solve addition, subtraction and multiplication problems involving decimals to ten thousandths. 3. Solve word problems, involving money, using the four basic operations. 4. Complete equations and inequalities. 5. Solve 2-step word problems involving the four basic operations with whole numbers. 6. Use hand held calculators to: a. perform basic operations with whole numbers, b. accomplish addition, subtraction, and multiplication of decimals, and c. to divide decimals by whole numbers.

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4. DATA COLLECTION Demonstrate the ability to collect, reduce, display, and interpret data into meaningful terms.	1. Interpret graphs and make inferences.
5. MEASUREMENTS Demonstrate the ability to perform measurement in both metric and customary systems using appropriate tools.	1. Determine an appropriate unit of measure for measuring dimensions, capacity or weight of specific objects. 2. Rename aggregate quantities in terms of larger or smaller units. 3. Determine the perimeter of a polygon. 4. Determine the area of squares and rectangles.
6. PREDICTIONS Use mathematical data and concepts to make predictions.	1. Identify and complete a sequence of whole numbers in which there is a pattern of combinations of operations. 2. Identify the probability of an event happening as 0 or 1.
7. GEOMETRY Know and apply geometric concepts.	1. Identify and name polygons having 4, 5, 6, and 8 sides. 2. Identify similiar and congruent shapes. 3. Find the line of symmetry in plane figures. 4. Observe the various shapes and angles of objects in nature. 5. Use shapes and angles to draw objects. 6. Recognize and name pyramids. 7. Identify and count faces, vertices and edges of polyhedrons. 8. Make models of all basic space figures. 9. Graph ordered pairs in the first quadrant on the coordinate plane.
8. COMPUTER LITERACY Develop an understanding of the capabilities, applications, limitations, and implications of computer technology in our society.	1. Differentiate between analyst, programmer, operator and computer technician on the basis of what they do. 2. Use general terms to describe a computer system (program, data, operator, console, memory, instruction, etc). 3. Cite examples of how computer technology has been used to benefit society.

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Goals/Objectives	NORMAL EXPECTANCIES

GRADE SIX

Primary Focus: A. Development of Vocabulary, Basic Concepts, and All Basic Operational Skills with Fractions.
B. Extension of Division of Decimals.

1. NUMBER AWARENESS

Identify the uniqueness of numbers, their meanings and relationships.

1. Read and write Roman numerals including L, C, D and M.
2. Identify infinite and finite sets.
3. Define ratio and proportion.
4. Identify reciprocals of fractions, whole numbers, and mixed numbers.
5. Rename whole numbers or mixed numbers as the sum of a whole number and improper fraction.
6. Compare mixed numbers with use of the symbols $>$, $<$, and $=$.
7. Read and write decimal fractions to millionths.
8. Express decimal fractions in number words.
9. Compare quantities expressed in decimal notation.
10. Recognize relationship between fractions and decimals.
11. Round decimal fractions, mixed numbers and dollars and cents.

2. COMPUTATIONAL SKILLS

Demonstrate proficiency with computational skills.

1. Divide by a 3 or more digit divisor.
2. Perform four basic operations with decimals, whole numbers, and mixed decimals.
3. Add and subtract common fractions with like denominators.
4. Add mixed numbers with like and unlike denominators.
5. Add 3 or more addends with like or unlike denominators.
6. Subtract mixed numbers with like and unlike denominators, without regrouping.
7. Use regrouping in subtracting mixed numbers and fractions with like and unlike denominators.
8. Multiply fractions by whole numbers, mixed numbers, and fractions.
9. Multiply mixed numbers by whole numbers, mixed numbers, and fractions.
10. Divide fractions by whole numbers, mixed numbers, and fractions.
11. Divide whole numbers by mixed numbers and fractions.
12. Divide mixed numbers by whole numbers, mixed numbers, and fractions.

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Goals/Objectives	Normal Expectancies
3. PROBLEM SOLVING Apply computational skills and mathematical reasoning in solving problems.	1. Solve word problems involving the four basic operations with whole numbers, decimals and fractions, using a logically structured method. 2. Describe the extraneous information and/or describe information that is missing. 3. Solve multi-step word problems involving the four basic operations with whole numbers and decimals. 4. Use hand held calculators to: a. solve problems involving currency exchange, b. perform basic operations with whole numbers and fractions, and c. to practice estimation through rounding.
4. DATA COLLECTION Demonstrate the ability to collect, reduce, display, and interpret data into meaningful terms.	1. Interpret charts and tables to make inferences. 2. Research and select relevant information for display.
5. MEASUREMENT Demonstrate the ability to perform measurement in both metric and customary systems using appropriate tools.	1. Use measuring instruments to measure fractional parts of length, volume, weight, and time. 2. Measure with precision. 3. Measure area of triangles, parallelograms, and trapezoids.
6. PREDICTIONS Use mathematical data and concepts to make predictions.	1. Perform probability experiments and tabulate possible outcomes.
7. GEOMETRY Know and apply geometric concepts.	1. Recognize planes and parts of planes. 2. Identify and describe geometric forms in ancient and contemporary art and architecture. (E) 3. Discuss geometric properties of polygons having 4, 5, 6, and 8 sides. 4. Compare and contrast attributes of each of the space figures. 5. Define parallel, intersecting and perpendicular lines.
8. COMPUTER LITERACY Develop an understanding of the capabilities, applications, limitations, and implications of computer technology in our society.	1. Discuss requirements, tasks, and benefits involved in computer occupations. 2. Use appropriate terms to explain how a computer system works.

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Goals/Objectives	NORMAL EXPECTANCIES

GRADE SEVEN

Primary Focus: A. Development of the Relationships Among the Whole Number, Fractions and Decimals.
B. Extension of Measurements in Plane and Solid Geometry.

1. NUMBER AWARENESS Identify the uniqueness of numbers, their meanings and relationships.	1. Show how and why ancient number systems were developed in relation to our present system. 2. Identify the coordinates of points on the number line using the set of positive rational numbers. 3. Graph positive rational numbers on the number line. 4. Recognize a terminating decimal as a fraction. 5. Express repeating decimals by use of the vinculum. 6. Recognize relationships among fractions, decimals and percents. 7. Read and write numbers using exponential notations.
2. COMPUTATIONAL SKILLS Demonstrate proficiency with computational skills.	1. Perform the four operations with whole numbers, decimals, and fractions. 2. Multiply and divide whole numbers and decimals by powers of 10 by relocation of the decimal point. 3. Change common fractions to decimal fractions and mixed numerals to mixed decimals. 4. Change terminating decimal fractions to common fractions and, mixed decimals to mixed numerals. 5. Demonstrate an understanding of the order of operations. 6. Convert fractions and decimals to percents. 7. Convert percents to fractions and decimals.
3. PROBLEM SOLVING Apply computational skills and mathematical reasoning in solving problems.	1. Illustrate word problems with the use of diagrams, pictures, etc. 2. Solve word problems with information displayed in tables, graphs and charts. 3. Solve word problems using geometric formulas. 4. Solve multi-step word problems using the four basic operations with whole numbers, decimals and fractions.
4. DATA COLLECTION Demonstrate the ability to collect, reduce, display, and interpret data into meaningful terms.	1. Read and interpret circle graphs. 2. Complete a circle graph from given data. 3. Identify "mean," "median," "mode," and "range". 4. Interpret and make inferences from graphical data including those displayed with percentage notation.

Goals/Objectives	NORMAL EXPECTANCIES
5. MEASUREMENTS Demonstrate the ability to perform measurement in both metric and customary systems using appropriate tools.	1. Draw and measure angles using a protractor, straightedge and pencil. 2. Determine the circumference or perimeter and area of any regular plane geometric figure using formulas. 3. Determine the volume of rectangular prisms using formulas. 4. Use protractors to bisect angles.
6. PREDICTIONS Use mathematical data and concepts to make predictions.	1. Identify terminology used in probability and statistics. 2. Identify the probability of paired events.
7. GEOMETRY Know and apply geometric concepts.	1. Discuss basic properties of point, line, line segment, ray, angle, plane and half-plane. 2. Compare line segments, angles and polygons for congruency. 3. Recognize and name equilateral, isosceles and scalene triangles. 4. Identify corresponding parts of congruent or similar figures. 5. Recognize and name acute, right and obtuse angles. 6. Identify pairs of angles having special relationships; supplementary, complementary, adjacent and vertical angles. 7. Identify radius. 8. Identify parallel, intersecting and perpendicular planes. 9. Use a compass to construct arcs and circles.
8. COMPUTER LITERACY Develop an understanding of the capabilities, applications, limitations, and implications of computer technology in our society.	1. Identify the names of important pioneers in the development of computers and state what their major contributions were. 2. Identify the two basic types of computers. 3. List the five parts in the organization of a digital computer. 4. List various methods for input and output of information in communicating with a computer. 5. Identify the characteristics of the punched card. (Ex. number of columns, how a computer obtains data from one). 6. Describe how a computer differs from other calculating machines. 7. Identify user languages and explain how their names were derived. 8. Describe the difference between computer "hardware" and "software".

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Grade/Class	NORMAL EXPECTANCIES

GRADE EIGHT

Primary Focus: A. Review of Basic Operations with Whole Numbers, Fractions and Decimals.
B. Introduce Real Number System.
C. Practice with Application of Concepts Previously Learned.

1. NUMBER AWARENESS Identify the uniqueness of numbers, their meanings and relationships.	1. Graph rational numbers on a number line. 2. Define the set of real numbers. 3. Recognize the magnitude of numbers expressed in scientific notation. 4. Explain and illustrate the commutative, associative and distributive properties as they pertain to addition and multiplication of rational numbers.
2. COMPUTATIONAL SKILLS Demonstrate proficiency with computational skills.	1. Perform sequential operations and procedures with whole numbers, decimal or fractions. 2. Solve proportions. 3. Change repeating decimals to fractions. 4. Complete percentage equations.
3. PROBLEM SOLVING Apply computational skills and mathematical reasoning in solving problems.	1. Solve word problems involving percents and proportions. 2. Solve problems involving the Pythagorean Theorem. 3. Use formulas to solve word problems. 4. Solve word problems having consumer and career application.
4. DATA COLLECTION Demonstrate the ability to collect, reduce, display, and interpret data in meaningful terms.	1. Analyze data graphically displayed and estimate future consequences. 2. Determine the most appropriate method of displaying data, including polls, frequency tables and histograms.
5. MEASUREMENTS Demonstrate the ability to perform measurement in both metric and customary systems using appropriate tools.	1. Determine surface area of cylinders and rectangular prisms using formulas. 2. Determine volume of cylinders, pyramids, and cones using formulas.

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Goals/Objectives	NORMAL EXPECTANCIES
6. PREDICTIONS Use mathematical data and concepts to make predictions.	1. Analyze information of mean, median, and/or mode to predict probable outcomes. 2. Determine the probability of a pair of independent events. 3. Determine the probability of a pair of dependent events. 4. Use the table of outcomes from an appropriate sample space to predict the probability of future outcomes.
7. GEOMETRY Know and apply geometric concepts.	1. Compare 3 and 4 sided polygons for congruency using relationships of sides and angles. 2. Discuss the Pythagorean Theorem. 3. Determine the length of the missing side of one of a pair of congruent or similar polygons. 4. Determine the sum of the interior angles of any polygon. 5. Determine the measure of an interior angle of any regular polygon. 6. Discuss relationships among the angles formed when parallel lines are cut by a transversal. 7. Construct congruent line segments, angles, and bisectors. 8. Use compass and straightedge to construct polygons. 9. Locate and identify ordered pairs on the coordinate plane. 10. Graph ordered pairs on a coordinate plane.
8. COMPUTER LITERACY Develop an understanding of the capabilities, applications, limitations, and implications of computer technology in our society.	1. Design an algorithm for the completion of a task by dividing the task into smaller subtasks and then doing the same until each subtask (or step) is concise enough not to need further description. 2. Make a flowchart to help describe the algorithm at each step of its design using the standard flowcharting symbols. 3. Distinguish algorithmic steps which are simple enough to accomplish without further division, from those which are not. 4. Associate each of the following flow charting symbols with a specific kind of action by using them correctly in a flowchart: a. rectangle—process, b. diamond—decision, c. oval—termination (beginning or ending), d. circle—connection, e. parallelogram—input/output, f. (left arrow)—replacement (assigning a value), g. : (colon)—comparison of value. 5. Solve problems involving the use of student designed algorithms.

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